FM1/2
100.0 MHz

S.O. # 05340B

SYSTEMS WITH RELIABILITY, INC.
Broadcast Antennas and Transmission Systems

TECHNICAL MANUAL

FM1 Series
OMNI-DIRECTIONAL LOW POWER ANTENNA

TABLE OF CONTENTS

SECTION I

GENERAL DESCRIPTION

INTRODUCTION

This technical manual contains information required to install, test, operate, and service the ***FM1 Omnidirectional FM Antennas***. This consists of various sections which, provides the following type of information:

A. **SECTION I.** ***GENERAL DESCRIPTION***. Provides a description of the equipment, identifies the major components, and lists the specifications.
B. **SECTION II.** ***PRINCIPLES OF OPERATION***. Provides a description of how the antenna operates.
C. **SECTION III.** ***INSTALLATION.*** Provides information relative to the installation of the antenna components and the installation of components on the tower.
D. **SECTION IV**. ***MAINTENANCE***. Provides information pertaining to preventive and scheduled maintenance.
E. **SECTION V.** ***TEST REPORT.*** Provides data measured at the SWR Antenna Test Site to demonstrate the measured electrical and radiation characteristics of the antenna. This section also provides other reports required by the customer specifications.

EQUIPMENT SUPPLIED

The FM1 antenna supplied is shown in the SWR installation drawing located at the Appendix, FM1 parts list, identify all major components supplied and the Antenna Specification Summary exhibits the Mechanical and Electrical Characteristics of the Antenna

GENERAL DESCRIPTION

The antenna system supplied is an FM1 Omnidirectional FM Antenna. The antenna is designed to meet the power handling and pattern specifications as requested.

SECTION II

PRINCIPLES OF OPERATION

2.1.0 INTRODUCTION

The ***FM1 Low Power FM Antenna*** is ideal for medium and low power FM broadcast stations or translators that require circular polarization. This antenna type is available for frequencies ranging from 88-108 MHz. It is circularly polarized; to provide dual polarization necessary for whip antennas and other antennas not oriented to receive vertically or horizontally polarized signals. It has a 500 watts rating per bay and may be stacked up to 6 bays for additional gain.

2.2.0 FUNCTIONAL DESCRIPTION

2.2.1 The ***FM1*** is a typical loop/dipole fm antenna, which radiates vertical and horizontal components in quadrature phase.

2.2.2 It is constructed of stainless steel and is factory tuned to the specified frequency. It can also be re-tuned in the field, to a different frequency through the adjustable threaded stubs at the end of the radiating elements.

2.2.3 The antenna is stacked about one wavelength apart and is narrow band, having a VSWR over a single channel of less than 1.1:1.

2.3.0 PATTERN OPTIMIZATION

2.3.1 The azimuth pattern is omnidirectional for both the horizontal and vertical components.

WARNING

IMPROPER ANTENNA INSTALLATION CAN CAUSE SERIOUS PATTERN PROBLEMS.

SECTION III

INSTALLATION

3.1.0 INTRODUCTION

3.1.1 Installation of the antenna should be properly planned and carried out, to avoid delays and unwarranted costs. Make sure that all materials are on hand before calling for rigging services.

3.1.2 Riggers must be mechanically well equipped to do the job. They should also be knowledgeable about antennas and coax line and should inspect the tower and check the mounting design of the brackets, prior to the arrival of the entire crew.

3.2.0 RECEIVING AND UNPACKING

3.2.1 The antenna elements are normally shipped in boxes, usually numbered and the total number is indicated on each box; contact shipper if boxes are not all delivered, or if equipment received is damaged. **DO NOT STORE THE MATERIALS OUTDOORS, BOXED OR OTHERWISE.**

3.2.2 Once received, open and examine for shipping damages so that any necessary claims may be filed with the shipping company immediately. Check the material against the packing list.

3.2.3 Carefully remove the radiating elements. Lifting only from the square boom section.

WARNING

DO NOT HANDLE ELEMENTS BY THE RADIATING DIPOLES OR THE FEED ARMS.

3.2.4 The box with the installation drawing and instruction manual is usually ***Box # 1.*** Open it first so that the balance of the items may be easily identified and counted. Contact SWR for missing materials or for damages in the materials caused by shipping.

3.3.0 EXCHANGES

3.3.1 In case of damages, file a claim with the carrier and return prepaid to SWR, Inc. for repair.

3.4.0 INSTALLATION PRE-CHECK AND CAUTIONS

3.4.1 The antenna element is shipped in boxes separated from the parasitics.

3.3.4. Examine the elements for bent radiating arm and cracks. If cracked, file a claim with the freighting carrier and return prepaid to SWR for repair. The elements have been carefully packed to withstand strain and should not be damaged under normal truck handling.

3.3.5 Keep all moisture, dirt or any foreign matter of coaxial parts and elements.

NOTE

DO NOT LEAVE THE ANTENNA PARTS WHERE RAIN OR MOISTURE CAN ENTER. STORE INDOORS AND KEEP UNITS CAPPED AS RECEIVED

3.3.6 Protect all antenna parts from physical damage and abuse. Do not allow any part of the antenna to bang against tower steel, concrete or permit it to drag in the dirt.

NOTE

HOIST ANTENNA MEMBERS CAREFULLY WITH A TAG LINE TO PREVENT DAMAGE BY STRIKING AGAINST THE TOWER.

3.5.0 MOUNTING INSTRUCTIONS

3.5.1 The FM antenna has been shipped with the complete hardware necessary for its installation.

3.5.2 Look at the installation drawing at the back of this manual. The drawing shows all the mounting dimensions. THEY SHOULD BE FOLLOWED WITHIN A +/- ½ INCH FOR BEST RESULTS.

3.5.3 Choose the tower leg or face in the direction where maximum signal is desired. Mark on this leg or face the location of the center of radiation of the antenna array. This installation requires the positioning of the bay at its correct location and fastened to the tower leg or face with the proper U-bolts provided.

3.5.4 Hoist the assembled antenna into the air. Use proper hoisting nylon slings, keeping the assembly in a vertical position for ease of installation. Bays should be aligned vertically plumb. Secure feedlines approximately every 12".

3.5.5 Utilize the mounting brackets supplied with the antenna to secure the vertical support pipe.

3.5.6 All connections should be wrapped with rubber tape and wrapped with a final cover of vinyl tape, which is also provided. An electrical outdoor coating can also be applied.

3.5.7 If semi-flexible cable such as Heliax or Flexwell is used, it should be firmly tied down at least every 3ft of coax line.

3.5.8 Lines should be grounded every 200 ft (60m) on long vertical runs. It should also be grounded at the top and at the bottom of the vertical run and again at the front where it

enters the equipment building. Grounding kits are available for all standard transmission line cables. These kits provide a low resistance method of connecting the ground system to the main transmission line.

3.5.9 Install the lightning rod one foot (0.3m) higher than the uppermost part of the obstruction light.

3.5.10 The FM antenna itself should be firmly grounded on the tower.

3.5.11 A ground system should be located immediately around the base of the tower. This should have a direct current loss of less than 10 ohms to earth ground. This low resistance may be obtained using ground wires buried in the soil.

WARNING

THE LINE MANUFACTURER'S HANGERS SHOULD BE USED. THE LINES SHOULD NOT BE ATTACHED TO THE TOWER USING WRAP-LOCK STRAPS.

3.5.18 Pressurization is not required for this type of antenna.

SECTION IV

MAINTENANCE

4.1.0 SAFETY WARNING

WARNING

ONLY QUALIFIED PERSONNEL SHOULD BE ENGAGED TO PERFORM A "TOWER-TOP" INSPECTION OF THE ANTENNA. ONLY PERSONS WITH PREVIOUS FIELD EXPERIENCE IN TOWER CLIMBING AND ANTENNA INSPECTION SHOULD BE CONSIDERED QUALIFIED.

BEFORE CLIMBING INTO THE APERTURE OF THE ANTENNA AND PRIOR TO INSPECTION, ALL TRANSMITTER POWER MUST BE TURNED OFF. PRECAUTIONS SHOULD BE TAKEN TO PREVENT RESTORATION OF TRANSMITTER POWER DURING THE ANTENNA INSPECTION. THE DANGER FROM HIGH POWER RF RADIATION IS SEVERE AND EVEN MINIMAL EXPOSURE CAN CAUSE LONG LASTING EFFECTS.

IF TRANSMITTER POWER IS RESTORED DURING THE INSPECTION, THE INSPECTOR SHOULD IMMEDIATELY RETURN TO A POSITION BELOW TOWER TOP OR OUTSIDE THE ANTENNA APERTURE AND INSTRUCT THE OPERATOR TO TURN OFF THE TRANSMITTER POWER. UNDER NO CIRCUMSTANCES SHOULD HE CONTINUE THE INSPECTION UNTIL THE TRANSMITTER POWER IS TURNED OFF AND PRECAUTIONS HAVE BEEN TAKEN THAT THE POWER CAN BE RESTORED DURING FURTHER INSPECTIONS.

4.2.0 SERVICE INTERVALS

4.2.1 A qualified rigger should check the antenna system every time obstruction lights are replaced or if lights are not used, at least once a year. The rigger should look for vibration and storm damage, loose or broken coax hangers and missing or loose hardware.

4.2.2 Signs of arcing across exposed insulators should also be checked. Wipe clean all exposed insulators in each antenna element with a rag soaked in 91% isopropyl or other solvent alcohol (Denatured Alcohol).

WARNING
DO NOT USE CARBON TETRACHLORIDE!

4.3.0 PRESSURIZATION

4.3.1 Antennas do not require pressurization.

4.4.0 FASTENERS AND HARDWARE

4.4.1 Structural Fasteners: High strength hot dip galvanized for bracket bolts and nuts with locking devices are recommended at all structural connections. Inspect for damaged or missing fasteners and replace.

4.5.0 CLIMBING FACILITIES

4.5.1 This antenna is not typically equipped with climbing devices. Access to the antenna can be accomplished via the support tower as required.

4.6.0 GENERAL CORROSION PROTECTION AND REPAIR (for Special Support Brackets Only)

4.6.1 Hot dip galvanized structural steel if the finish has been damaged due to handling, field welding etc., the following procedure should be followed to insure adequate corrosion protection:

A. Remove rust, scale, and old paint by wire brushing, sanding or sand blasting.
B. Apply Z.R.C. metal conditioner per label directions. Allow to set a minimum of 5 minutes prior to wiping.
C. Apply a heavy, brush coat of Z.R.C. cold galvanizing compound per label directions. Allow to dry for 12 hours.
D. Apply a second brush coat of Z.R.C. cold galvanizing compound. Allow ample cure time prior to applying any topcoat.

4.6.2 In areas of severe corrosion, additional protection can be provided by top coating with epoxy mastic such as Carbolines Carbomastic 15.

4.6.3 Aluminum: If the finish has been damaged due to handling, corrosion, etc. clean damaged area using a non-ferrous wire brush. Clean affected area using a suitable detergent or cleaning agent. Apply a protective coat of enamel or other suitable paint.

4.7.0 ELECTRICAL DEICING & RADOMES (OPTIONAL)

4.7.1 For areas with heavy icing and/or snow conditions, optional deicers or radomes are available.

4.7.2 Refer to installation drawing for installation notes and operating voltages, etc.

DEICING SYSTEM SHOULD NOT BE OPERATED WHEN AMBIENT TEMPERATURE IS HIGHER THAN 40° F. DAMAGE TO ANTENNA OR DEICERS MAY RESULT.

4.8.0 TECHNICAL ASSISTANCE

4.8.1 SWR Technical and Trouble shooting assistance is available during normal business hours (8:00am – 5:00pm). Emergency service is available 24 hours a day. **USA Office**: 619 Industrial Park Road, PO Box 856, Ebensburg, PA 15931 ***Tel. No.*** : 1-800-762-7743 ***Fax:*** 814-472-5552 **PHILIPPINES (ASIA) Office**: 31 E Scout Bayoran St. Quezon City Tel. No.: 632-411-0066 Fax No.: 632-410-6527

SECTION V

REPORTS

5.1.0 INTRODUCTION

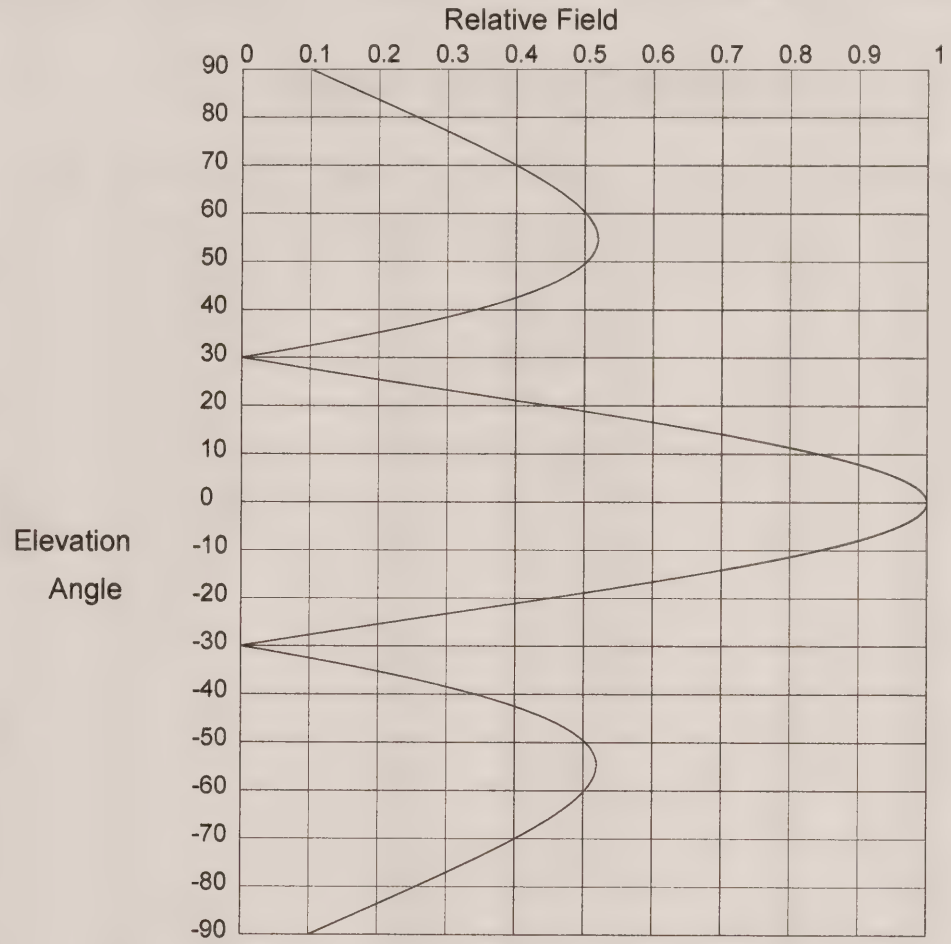
5.1.1 This section contains the technical manual reports.

5.2.0 ELEVATION PLANE PATTERN

A calculated elevation plane pattern is included. Measured elevation patterns are included in the FM Antenna Test Data Section.

5.2.1 VSWR MEASUREMENTS

Measured input impedance of the array is included in the FM Antenna Test Data Section and is recorded on an expanded Smith Chart plot. The plot is continuous across the frequency band of the channel.



Elevation Pattern

Scale: Linear

Units: Field, Relative

Systems With Reliability

CLIENT: *Ramsey Electronics*

Date: 7/19/2005

ANTENNA TYPE: FM1/2

FREQUENCY: 100

PATTERN POL.: Circular

DIRECTIVITY(Peak): 1.918/2.828 dBd

Beam Tilt (Deg.) : *0*

DIRECTIVITY(Horiz): 1.918/2.828 dBd

Null Fill(s)(%) : *0, 0, 0*

Micro-Tek Eng. Ver. 2000

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
90.0	.10 (-20)	52.0	.514 (-5.775)	14.0	.705 (-3.031)
89.0	.116 (-18.733)	51.0	.51 (-5.855)	13.0	.743 (-2.581)
88.0	.131 (-17.627)	50.0	.503 (-5.963)	12.0	.779 (-2.174)
87.0	.147 (-16.648)	49.0	.495 (-6.101)	11.0	.812 (-1.809)
86.0	.163 (-15.768)	48.0	.486 (-6.272)	10.0	.843 (-1.482)
85.0	.178 (-14.971)	47.0	.474 (-6.479)	9.8	.849 (-1.421)
84.0	.194 (-14.242)	46.0	.461 (-6.724)	9.6	.855 (-1.361)
83.0	.21 (-13.571)	45.0	.446 (-7.013)	9.4	.861 (-1.303)
82.0	.225 (-12.951)	44.0	.429 (-7.349)	9.2	.866 (-1.246)
81.0	.241 (-12.374)	43.0	.41 (-7.738)	9.0	.872 (-1.191)
80.0	.256 (-11.836)	42.0	.39 (-8.189)	8.8	.877 (-1.137)
79.0	.271 (-11.332)	41.0	.367 (-8.709)	8.6	.883 (-1.084)
78.0	.286 (-10.859)	40.0	.342 (-9.31)	8.4	.888 (-1.033)
77.0	.301 (-10.415)	39.0	.316 (-10.008)	8.2	.893 (-0.983)
76.0	.316 (-9.997)	38.0	.288 (-10.824)	8.0	.898 (-0.935)
75.0	.331 (-9.603)	37.0	.257 (-11.786)	7.8	.903 (-0.887)
74.0	.345 (-9.231)	36.0	.225 (-12.937)	7.6	.908 (-0.841)
73.0	.36 (-8.881)	35.0	.192 (-14.343)	7.4	.912 (-0.797)
72.0	.374 (-8.551)	34.0	.156 (-16.113)	7.2	.917 (-0.753)
71.0	.387 (-8.24)	33.0	.119 (-18.454)	7.0	.921 (-0.711)
70.0	.401 (-7.948)	32.0	.081 (-21.828)	6.8	.926 (-0.67)
69.0	.413 (-7.673)	31.0	.041 (-27.712)	6.6	.93 (-0.631)
68.0	.426 (-7.417)	30.0	.00 (-50)	6.4	.934 (-0.593)
67.0	.438 (-7.178)	29.0	.042 (-27.469)	6.2	.938 (-0.556)
66.0	.449 (-6.956)	28.0	.086 (-21.343)	6.0	.942 (-0.52)
65.0	.46 (-6.751)	27.0	.13 (-17.727)	5.8	.946 (-0.485)
64.0	.47 (-6.563)	26.0	.175 (-15.145)	5.6	.949 (-0.452)
63.0	.479 (-6.392)	25.0	.22 (-13.135)	5.4	.953 (-0.42)
62.0	.488 (-6.239)	24.0	.266 (-11.491)	5.2	.956 (-0.389)
61.0	.495 (-6.103)	23.0	.312 (-10.103)	5.0	.959 (-0.36)
60.0	.502 (-5.986)	22.0	.359 (-8.906)	4.8	.963 (-0.331)
59.0	.508 (-5.887)	21.0	.405 (-7.858)	4.6	.966 (-0.304)
58.0	.512 (-5.807)	20.0	.45 (-6.929)	4.4	.969 (-0.278)
57.0	.516 (-5.747)	19.0	.495 (-6.1)	4.2	.971 (-0.253)
56.0	.518 (-5.708)	18.0	.54 (-5.356)	4.0	.974 (-0.229)
55.0	.519 (-5.69)	17.0	.583 (-4.685)	3.8	.976 (-0.207)
54.0	.519 (-5.694)	16.0	.625 (-4.078)	3.6	.979 (-0.186)
53.0	.517 (-5.722)	15.0	.666 (-3.528)	3.4	.981 (-0.165)

Systems With Reliability

CLIENT: *Ramsey Electronics*
Date: 7/19/2005
ANTENNA TYPE: FM1/2
FREQUENCY: 100
PATTERN POL.: Circular
DIRECTIVITY(Peak): 1.918/2.828 dBd
Beam Tilt (Deg.) : *0*
DIRECTIVITY(Horiz): 1.918/2.828 dBd
Null Fill(s)(%) : *0, 0, 0*

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
3.2	.983 (-0.146)	-4.4	.969 (-0.278)	-12.0	.779 (-2.174)
3.0	.985 (-0.129)	-4.6	.966 (-0.304)	-12.2	.772 (-2.252)
2.8	.987 (-0.112)	-4.8	.963 (-0.331)	-12.4	.765 (-2.332)
2.6	.989 (-0.097)	-5.0	.959 (-0.36)	-12.6	.757 (-2.413)
2.4	.991 (-0.082)	-5.2	.956 (-0.389)	-12.8	.75 (-2.496)
2.2	.992 (-0.069)	-5.4	.953 (-0.42)	-13.0	.743 (-2.581)
2.0	.993 (-0.057)	-5.6	.949 (-0.452)	-13.2	.736 (-2.667)
1.8	.995 (-0.046)	-5.8	.946 (-0.485)	-13.4	.728 (-2.755)
1.6	.996 (-0.037)	-6.0	.942 (-0.52)	-13.6	.721 (-2.845)
1.4	.997 (-0.028)	-6.2	.938 (-0.556)	-13.8	.713 (-2.937)
1.2	.998 (-0.021)	-6.4	.934 (-0.593)	-14.0	.705 (-3.031)
1.0	.998 (-0.014)	-6.6	.93 (-0.631)	-14.2	.698 (-3.126)
.8	.999 (-0.009)	-6.8	.926 (-0.67)	-14.4	.69 (-3.224)
.6	.999 (-0.005)	-7.0	.921 (-0.711)	-14.6	.682 (-3.323)
.4	1.00 (-0.002)	-7.2	.917 (-0.753)	-14.8	.674 (-3.425)
.2	1.00 (-0.001)	-7.4	.912 (-0.797)	-15.0	.666 (-3.528)
.0	1.00 (0)	-7.6	.908 (-0.841)	-15.2	.658 (-3.634)
-.2	1.00 (-0.001)	-7.8	.903 (-0.887)	-15.4	.65 (-3.742)
-.4	1.00 (-0.002)	-8.0	.898 (-0.935)	-15.6	.642 (-3.851)
-.6	.999 (-0.005)	-8.2	.893 (-0.983)	-15.8	.634 (-3.963)
-.8	.999 (-0.009)	-8.4	.888 (-1.033)	-16.0	.625 (-4.078)
-1.0	.998 (-0.014)	-8.6	.883 (-1.084)	-16.2	.617 (-4.194)
-1.2	.998 (-0.021)	-8.8	.877 (-1.137)	-16.4	.609 (-4.313)
-1.4	.997 (-0.028)	-9.0	.872 (-1.191)	-16.6	.60 (-4.435)
-1.6	.996 (-0.037)	-9.2	.866 (-1.246)	-16.8	.592 (-4.558)
-1.8	.995 (-0.046)	-9.4	.861 (-1.303)	-17.0	.583 (-4.685)
-2.0	.993 (-0.057)	-9.6	.855 (-1.361)	-17.2	.575 (-4.814)
-2.2	.992 (-0.069)	-9.8	.849 (-1.421)	-17.4	.566 (-4.945)
-2.4	.991 (-0.082)	-10.0	.843 (-1.482)	-17.6	.557 (-5.079)
-2.6	.989 (-0.097)	-10.2	.837 (-1.544)	-17.8	.549 (-5.216)
-2.8	.987 (-0.112)	-10.4	.831 (-1.608)	-18.0	.54 (-5.356)
-3.0	.985 (-0.129)	-10.6	.825 (-1.674)	-18.2	.531 (-5.499)
-3.2	.983 (-0.146)	-10.8	.818 (-1.74)	-18.4	.522 (-5.644)
-3.4	.981 (-0.165)	-11.0	.812 (-1.809)	-18.6	.513 (-5.793)
-3.6	.979 (-0.186)	-11.2	.805 (-1.879)	-18.8	.504 (-5.945)
-3.8	.976 (-0.207)	-11.4	.799 (-1.95)	-19.0	.495 (-6.1)
-4.0	.974 (-0.229)	-11.6	.792 (-2.023)	-19.2	.486 (-6.259)
-4.2	.971 (-0.253)	-11.8	.785 (-2.098)	-19.4	.477 (-6.421)

Systems With Reliability

Date: 7/19/2005

CLIENT: *Ramsey Electronics*
ANTENNA TYPE: FM1/2
FREQUENCY: 100
PATTERN POL.: Circular
DIRECTIVITY(Peak): 1.918/2.828 dBd
DIRECTIVITY(Horiz): 1.918/2.828 dBd

Beam Tilt (Deg.) : *0*
Null Fill(s)(%) : *0, 0, 0*

Relative Field Tabulation

Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)	Elev. Angle	Rel. Fld(dB)
-19.6	.468 (-6.587)	-27.2	.121 (-18.344)	-54.0	.519 (-5.694)
-19.8	.459 (-6.756)	-27.4	.112 (-19.006)	-55.0	.519 (-5.69)
-20.0	.45 (-6.929)	-27.6	.103 (-19.721)	-56.0	.518 (-5.708)
-20.2	.441 (-7.106)	-27.8	.094 (-20.496)	-57.0	.516 (-5.747)
-20.4	.432 (-7.288)	-28.0	.086 (-21.343)	-58.0	.512 (-5.807)
-20.6	.423 (-7.473)	-28.2	.077 (-22.278)	-59.0	.508 (-5.887)
-20.8	.414 (-7.663)	-28.4	.068 (-23.322)	-60.0	.502 (-5.986)
-21.0	.405 (-7.858)	-28.6	.06 (-24.503)	-61.0	.495 (-6.103)
-21.2	.396 (-8.057)	-28.8	.051 (-25.863)	-62.0	.488 (-6.239)
-21.4	.386 (-8.261)	-29.0	.042 (-27.469)	-63.0	.479 (-6.392)
-21.6	.377 (-8.471)	-29.2	.034 (-29.429)	-64.0	.47 (-6.563)
-21.8	.368 (-8.686)	-29.4	.025 (-31.951)	-65.0	.46 (-6.751)
-22.0	.359 (-8.906)	-29.6	.017 (-35.496)	-66.0	.449 (-6.956)
-22.2	.349 (-9.132)	-29.8	.008 (-41.54)	-67.0	.438 (-7.178)
-22.4	.34 (-9.365)	-30.0	.00 (-50)	-68.0	.426 (-7.417)
-22.6	.331 (-9.604)	-31.0	.041 (-27.712)	-69.0	.413 (-7.673)
-22.8	.322 (-9.85)	-32.0	.081 (-21.828)	-70.0	.401 (-7.948)
-23.0	.312 (-10.103)	-33.0	.119 (-18.454)	-71.0	.387 (-8.24)
-23.2	.303 (-10.364)	-34.0	.156 (-16.113)	-72.0	.374 (-8.551)
-23.4	.294 (-10.632)	-35.0	.192 (-14.343)	-73.0	.36 (-8.881)
-23.6	.285 (-10.909)	-36.0	.225 (-12.937)	-74.0	.345 (-9.231)
-23.8	.276 (-11.195)	-37.0	.257 (-11.786)	-75.0	.331 (-9.603)
-24.0	.266 (-11.491)	-38.0	.288 (-10.824)	-76.0	.316 (-9.997)
-24.2	.257 (-11.797)	-39.0	.316 (-10.008)	-77.0	.301 (-10.415)
-24.4	.248 (-12.113)	-40.0	.342 (-9.31)	-78.0	.286 (-10.859)
-24.6	.239 (-12.441)	-41.0	.367 (-8.709)	-79.0	.271 (-11.332)
-24.8	.23 (-12.781)	-42.0	.39 (-8.189)	-80.0	.256 (-11.836)
-25.0	.22 (-13.135)	-43.0	.41 (-7.738)	-81.0	.241 (-12.374)
-25.2	.211 (-13.503)	-44.0	.429 (-7.349)	-82.0	.225 (-12.951)
-25.4	.202 (-13.887)	-45.0	.446 (-7.013)	-83.0	.21 (-13.571)
-25.6	.193 (-14.287)	-46.0	.461 (-6.724)	-84.0	.194 (-14.242)
-25.8	.184 (-14.706)	-47.0	.474 (-6.479)	-85.0	.178 (-14.971)
-26.0	.175 (-15.145)	-48.0	.486 (-6.272)	-86.0	.163 (-15.768)
-26.2	.166 (-15.606)	-49.0	.495 (-6.101)	-87.0	.147 (-16.648)
-26.4	.157 (-16.092)	-50.0	.503 (-5.963)	-88.0	.131 (-17.627)
-26.6	.148 (-16.605)	-51.0	.51 (-5.855)	-89.0	.116 (-18.733)
-26.8	.139 (-17.149)	-52.0	.514 (-5.775)	-90.0	.10 (-20)
-27.0	.13 (-17.727)	-53.0	.517 (-5.722)	90.0	.00 (-50)

Systems With Reliability

CLIENT: *Ramsey Electronics*
Date: 7/19/2005
ANTENNA TYPE: FM1/2
FREQUENCY: 100
PATTERN POL.: Circular
DIRECTIVITY(Peak): 1.918/2.828 dBd
Beam Tilt (Deg.) : *0*
DIRECTIVITY(Horiz): 1.918/2.828 dBd
Null Fill(s)(%) : *0, 0, 0*

SYSTEMS WITH RELIABILITY, INC.
Broadcast Antennas and Transmission Systems

619 Industrial Park Road · PO Box 856 · Ebensburg, PA 15931-0856
Phone: (814) 472-5436
FAX: (814) 472-5552

Certified Proof Of Performance

Customer:	Ramsey Electronics
Date:	07/19/05
Antenna Model:	FM1/2
Frequencies Tested:	100 MHz
RL @ Frequencies:	-34.6 dB
Shop Order No.:	05340B
Input:	Type N Female

A reading of –17.7 dB is indicative of a 1.3:1 VSWR. The antenna specified has met or exceeds this 1.3:1 VSWR performance specification.

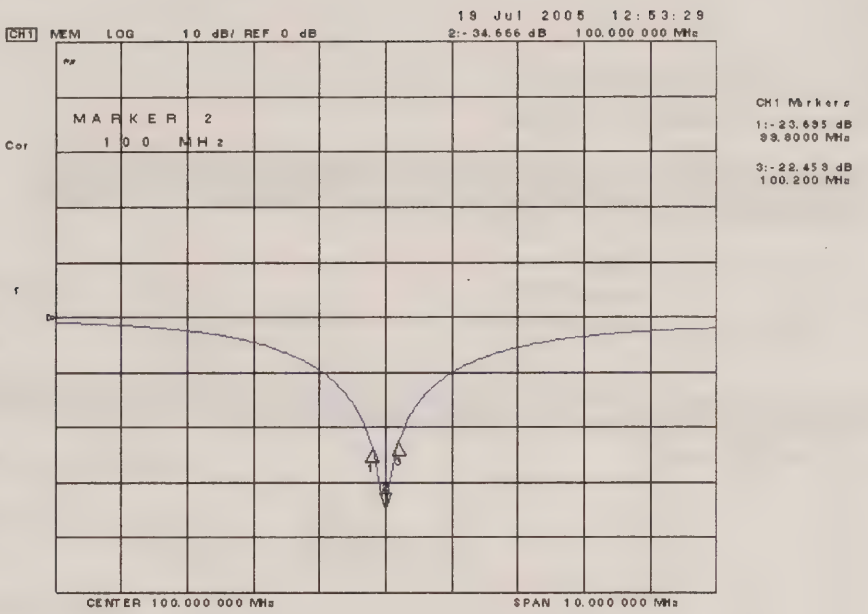
Computer / Network Analyzer plots enclosed to verify antenna performance.

Test Performed by:

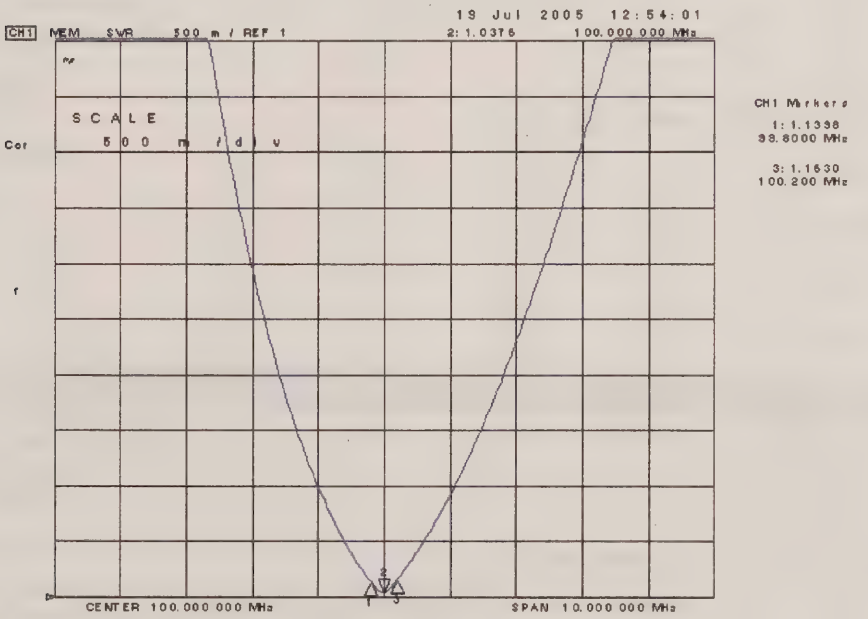
Matthew T. Edmiston
SWR Engineer / Technician

S.O.05340B FM1/2 100 MHz

log mag



VSWR



SYSTEMS WITH RELIABILITY, Inc.

Broadcast Antenna & Transmission Systems

ANTENNA SPECIFICATION SUMMARY

				Date :	7/19/2005
Antenna Type	:	FM1/2		**Frequency:**	100
Customer	:	Ramsey Electronics		**Shop Order No.:**	05340-B
Location	:	Victor,NY			

ELECTRICAL SPECIFICATION				Power	dB
Polarization Type: Circular					
Polarization Ratio:	**H-Pol**	50.0000	%		
	V-Pol	50.0000	%		
Elevation Directivity				1.918	2.828
Azimuth Directivity H-Pol.				1.000	0.000
Azimuth Directivity V-Pol.				1.000	0.000
Antenna Gain				0.959	-0.182
Power Capability				1 **kW**	
Beam Tilt				0 **degrees**	
Null Fill				0, 0, 0 **%**	
Input				Type N	

MECHANICAL SPECIFICATION	
Antenna Aperture Length	9.83 **ft.**
Center of Radiation (AGL)	TBD **ft.**
Wind Force (50/33)	9.00 **lb.**
Antenna Weight	24.75 **lb.**

Mechanical Specifications will be certified upon final construction and testing.
Note: Given values can be used for planning system.

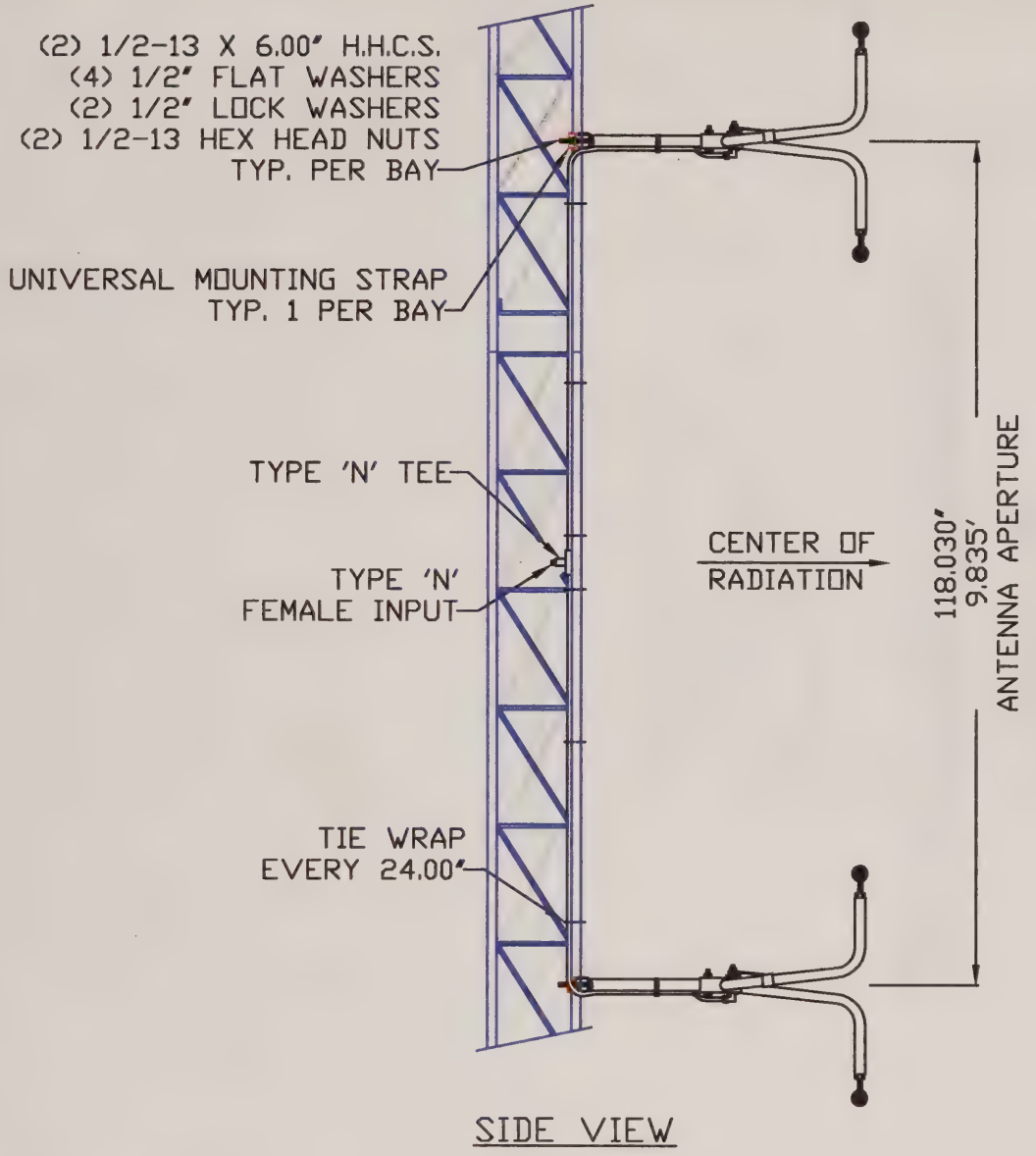
Prepared by:

Jagannath G Shanbhag

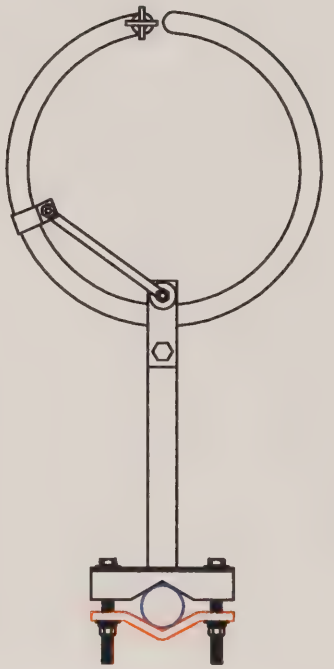
APPENDIX

NOTE:

DRAWING NUMBER: 0533D00



SIDE VIEW



TOP VIEW
NOT TO SCALE

TOLERANCES	
.X	± .015
.XX	± .005
.XXX	± .002
X/X	± 1/32
DEG.	± 1/2

UNLESS OTHERWISE SPECIFIED

REVISION RECORD

REV	APPROVAL	DATE

SYSTEMS WITH RELIABILITY, INC
619 INDUSTRIAL PARK ROAD
EBENSBURG, PENNSYLVANIA 15931

TITLE: FM1/2, FREQ. 100.0
VICTOR, NY

MATERIAL:

SIZE: A

PARTS MADE BY THIS DRAWING

DRAWING NUMBER: 0533D00

SCALE: NTS | NAME: RAC | DATE: 7/19/05 | SHEET 1 OF 1

SYSTEMS WITH RELIABILITY, INC.
Broadcast Antennas and Transmission Systems

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